

Serial No. 10/045,806
In Reply to Office Action mailed June 27, 2006
Page 2 of 19

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A parameter driven system for generating in near real time an optimal solution in response to employee transfer requests and leave requests for an entire enterprise, which comprises;

receiving means for providing input data including employee data, parameter values, configuration settings, said transfer requests, and said leave requests from a user; and

optimization processor means in electrical communication with said receiving means for automatically generating a mixed integer programming model with decision variables and constraints from said input data, and solving said mixed integer programming model in near real time to generate awards to employees including said transfer requests, said leave requests, new hire location assignments, and last half period new hire location assignments, wherein the optimization processor optimally awards transfer and leave requests based on seniority of the employee.

2. (Currently Amended) A system for optimized processing of transfer requests, leave requests, new hire location assignments, and last half period new hire location assignments in managing employee staffing, which comprises:

a user interface for receiving parameter values and configuration settings from a user, and accessing said transfer requests, said leave requests, and employee data;

a database in electrical communication with said user interface and having stored therein said transfer requests, said leave requests, and said employee data; and

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 3 of 19

an optimization processor in electrical communication with said user interface and receiving said employee data, said parameter values, and said configuration settings from said user, and at least one of said transfer requests and said leave requests from said database for generating an optimized solution in near real time for all employees of an organization, said optimized solution having at least one of awards of said leave requests[,] and awards of said transfer requests, wherein the transfer and leave awards are based on seniority of the employees said new hire location assignments, and said last half period new hire location assignments.

3. (Original) The system of Claim 2, wherein said optimized solution is obtained by solving a mixed integer programming model having at least one objective function, and comprised of decision variables and constraints developed from said employee data, said leave requests, said transfer requests, said parameter values, and said configuration settings.

4. (Currently Amended) The system of Claim 3, wherein said constraints include the following seniority transfer processing constraints:

- (i) $x_{k,j} - x_{k',j} \leq 0$, $\forall k \in \Phi_j$, $\forall k' \in \Phi_j$, $\forall k' \gg k$, $\forall j \in J$;
- (ii) $y_{k,j} - x_{k',j} \leq 0$, $\forall k \in \Phi_j \setminus \Phi_j'$, $\forall k' \in \Phi_j$, $\forall k' \gg k$, $\forall j \in J$;
- (iii) $x_{k,j} - x_{k',j} - y_{k',j} \leq 0$, $\forall k \in \Phi_j$, $\forall k' \in \Phi_j \setminus \Phi_j'$, $\forall k' \gg k$, $\forall j \in J$; and
- (iv) $y_{k,j} - x_{k',j} - y_{k',j} \leq 0$, $\forall k \in \Phi_j \setminus \Phi_j'$, $\forall k' \in \Phi_j \setminus \Phi_j'$, $\forall k' \gg k$, $\forall j \in J$;

<<start underline>>

wherein k , k' are employees;

i , i' , j , j' are locations;

J is a set of locations;

Φ_j is a set of all employees with requests to transfer into location j ;

Φ_j' is a set of all employees whose primary transfer request is into location j ;

$x_{k,j}$ is a primary request for employee k to transfer into location j ; and

$y_{k,j}$ is a secondary request for employee k to transfer into location j .

Serial No. 10/045,806

In Reply to Office Action mailed June 27, 2006

Page 4 of 19

<<end underline>>

5. (Currently Amended) The system of Claim 3, wherein said constraints include the following full period leave seniority processing constraints:

$$(i) \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in \{JS, FP\}} w_{k',t} \leq 0, \text{ where}$$

$$k \in A_j \cup B_j, \quad k' \in A_j \cup B_j, \quad k' \gg k, \quad \forall j \in J; \text{ and}$$

$$(ii) \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) \leq 0, \text{ where}$$

$$k \in A_j \cup B_j, \quad k' \in B_j \setminus (A_j \cup B_j), \quad k' \gg k, \quad \forall j \in J;$$

<<start underline>>

wherein k, k' are employees;

i, i', j, j' are locations;

t are leave types;

J is a set of all locations;

A_j is a set of all employees who are senior partners of a jobshare request at location j ;

B_j is a set of all employees with full period leave requests at location j ;

B_j' is a set of all employees whose primary leave request is a full period leave request at location j ;

T is a set of all leave types;

$u_{k,j}$ is a secondary leave request at location j for employee k ;

$v_{k,j}$ is a third preference leave request at location j for employee k ;

$w_{k,j}$ is a primary leave request at location j for employee k ; and

$z_{k,j}$ is a fourth preference leave request at location j for employee k .

<<end underline>>

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 5 of 19

6. (Currently Amended) The system of Claim 3 wherein said constraints include the following half period leave seniority processing constraints:

(i) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - w_{k',FH} \leq 0$, where

$k \in C_j$, $k' \in C'_j$, $k' \gg k$, $\forall j \in J$;

(ii) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - \sum_{r \in T} (w_{k',r} + u_{k',r} + v_{k',r} + z_{k',r}) \leq 0$, where

$k \in C_j$, $k' \in C_j \setminus C'_j$, $k' \gg k$, $\forall j \in J$;

(iii) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - w_{k',LH} \leq 0$, where

$k \in D_j$, $k' \in D'_j$, $k' \gg k$, $\forall j \in J$; and

(iv) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - \sum_{r \in T} (w_{k',r} + u_{k',r} + v_{k',r} + z_{k',r}) \leq 0$, where

$k \in D_j$, $k' \in D_j \setminus D'_j$, $k' \gg k$, $\forall j \in J$;

<<start underline>>

wherein k , k' are employees;

i , i' , j , j' are locations;

r are leave types;

J is a set of locations;

T is a set of all leave types;

C_j is a set of all employees with first half leave requests at location j ;

C'_j is a set of all employees whose primary leave request is a first half leave request at location j ;

D_j is a set of all employees with last half leave requests at location j ;

D'_j is a set of all employees whose primary leave request is a last half leave request at location j ;

$u_{k,j}$ is a secondary leave request at location j for employee k ;

$v_{k,j}$ is a third preference leave request at location j for employee k ;

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 6 of 19

$w_{k,j}$ is a primary leave request at location j for employee k ; and

$z_{k,j}$ is a fourth preference leave request at location j for employee k .

<<end underline>>

7. (Currently Amended) The system of Claim 3, wherein said constraints include the following transfer/full period leave seniority processing constraints:

- (i) $\sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in \{JS, FP\}} w_{k',t} \leq 0$, where
 $k \in A_j \cup B_j$, $k' \in (A_j \cup B_j) \setminus \Theta_j \setminus \Phi_j$, $k' \gg k$, $\forall j \in J$;
- (ii) $\sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in \{JS, FP\}} w_{k',t} - x_{k',j} - y_{k',j} \leq 0$, where
 $k \in A_j \cup B_j$, $k' \in (A_j \cup B_j) \cap \Theta_j$, $k' \gg k$, $\forall j \in J$;
- (iii) $0 \leq \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - 2 \sum_{t \in \{JS, FP\}} w_{k',t} + x_{k',j} \leq 1$, where
 $k \in A_j \cup B_j$, $k' \in (A_j \cup B_j) \cap \Phi_j$, $k' \gg k$, $\forall j \in J$;
- (iv) $0 \leq \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - 2 \sum_{t \in \{JS, FP\}} w_{k',t} + y_{k',j} \leq 1$, where
 $k \in A_j \cup B_j$, $k' \in (A_j \cup B_j) \cap (\Phi_j \setminus \Theta_j)$, $k' \gg k$, $\forall j \in J$;
- (v) $\sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) \leq 0$, where
 $k \in A_j \cup B_j$, $k' \in (B_j \setminus B_j' \setminus A_j) \setminus \Theta_j \setminus \Phi_j$, $k' \gg k$, $\forall j \in J$;
- (vi) $\sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) - x_{k',j} - y_{k',j} \leq 0$,

where

- $k \in A_j \cup B_j$, $k' \in (B_j \setminus B_j' \setminus A_j) \cap \Theta_j$, $k' \gg k$, $\forall j \in J$;
- (vii) $0 \leq \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + x_{k',j} \leq 1$, where
 $k \in A_j \cup B_j$, $k' \in (B_j \setminus B_j' \setminus A_j) \cap \Phi_j$, $k' \gg k$, $\forall j \in J$; and

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 7 of 19

$$(viii) \quad 0 \leq \sum_{t \in \{JS, FP\}} (w_{k,t} + u_{k,t} + v_{k,t} + z_{k,t}) - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + y_{k',j} \leq 1,$$

where

$$k \in A_j \cup B_j, \quad k' \in (B_j \setminus B'_j \setminus A_j) \cap (\Phi_j \setminus \Phi'_j), \quad k' \gg k, \quad \forall j \in J;$$

<<start underline>>

wherein k, k' are employees;

i, i', j, j' are locations;

t are leave types;

J is a set of all locations;

T is a set of all leave types;

A_j is a set of all employees who are senior partners of a jobshare request at location j ;

B_j is a set of all employees with full period leave requests at location j ;

B'_j is a set of all employees whose primary leave request is a full period leave request at location j ;

Θ_j is a set of all employees currently at location j with requests to transfer out of location j ;

Φ_j is a set of all employees with requests to transfer into location j ;

Φ'_j is a set of all employees whose primary transfer request is into location j ;

$u_{k,j}$ is a secondary leave request at location j for employee k ;

$v_{k,j}$ is a third preference leave request at location j for employee k ;

$w_{k,j}$ is a primary leave request at location j for employee k ;

$x_{k,j}$ is a primary request for employee k to transfer into location j ;

$y_{k,j}$ is a secondary request for employee k to transfer into location j ; and

$z_{k,j}$ is a fourth preference leave request at location j for employee k .

<<end underline>>

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 8 of 19

8. (Currently Amended) The system of Claim 3, wherein said constraints include the following transfer/first half period leave seniority processing constraints:

(i) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - w_{k',FH} \leq 0$, where

$$k \in C_j, \quad k' \in C_j' \setminus \Theta_j \setminus \Phi_j, \quad k' \gg k, \quad \forall j \in J;$$

(ii) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - w_{k',FH} - x_{k',i} - y_{k',j} \leq 0$, where

$$k \in C_j, \quad k' \in C_j' \cap \Theta_j, \quad k' \gg k, \quad \forall j \in J;$$

(iii) $0 \leq w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - 2w_{k',FH} + x_{k',j} \leq 1$, where

$$k \in C_j, \quad k' \in C_j' \cap \Phi_j, \quad k' \gg k, \quad \forall j \in J;$$

(iv) $0 \leq w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - 2w_{k',FH} + y_{k',j} \leq 1$, where

$$k \in C_j, \quad k' \in C_j' \cap (\Phi_j \setminus \Phi_j'), \quad k' \gg k, \quad \forall j \in J;$$

(v) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) \leq 0$, where

$$k \in C_j, \quad k' \in (C_j \setminus C_j') \setminus \Theta_j \setminus \Phi_j, \quad k' \gg k, \quad \forall j \in J;$$

(vi) $w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) - x_{k',i} - y_{k',j} \leq 0$, where

$$k \in C_j, \quad k' \in (C_j \setminus C_j') \cap \Theta_j, \quad k' \gg k, \quad \forall j \in J;$$

(vii) $0 \leq w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + x_{k',j} \leq 1$, where

$$k \in C_j, \quad k' \in (C_j \setminus C_j') \cap \Phi_j, \quad k' \gg k, \quad \forall j \in J; \text{ and}$$

(viii) $0 \leq w_{k,FH} + u_{k,FH} + v_{k,FH} + z_{k,FH} - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + y_{k',j} \leq 1$, where

$$k \in C_j, \quad k' \in (C_j \setminus C_j') \cap (\Phi_j \setminus \Phi_j'), \quad k' \gg k, \quad \forall j \in J;$$

<<start underline>>

where k, k' are employees;

i, i', j, j' are locations;

t are leave types;

J is a set of all locations;

Serial No. 10/045,806
 In Reply to Office Action mailed June 27, 2006
 Page 9 of 19

T is a set of all leave types;

C_j is a set of all employees with first half leave requests at location j ;

C'_j is a set of all employees whose primary leave request is a first half leave request at location j ;

Θ_j is a set of all employees currently at location j with requests to transfer out of location j ;

Φ_j is a set of all employees with requests to transfer into location j ;

Φ'_j is a set of all employees whose primary transfer request is into location j ;

$u_{k,j}$ is a secondary leave request at location j for employee k ;

$v_{k,j}$ is a third preference leave request at location j for employee k ;

$w_{k,j}$ is a primary leave request at location j for employee k ;

$x_{k,j}$ is a primary request for employee k to transfer into location j ;

$y_{k,j}$ is a secondary request for employee k to transfer into location j ; and

$z_{k,j}$ is a fourth preference leave request at location j for employee k .

<<end underline>>

9. (Currently Amended) The system of Claim 3, wherein said constraints include the following transfer/last half period leave seniority processing constraints:

(i) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - w_{k',LH} \leq 0$, where

$$k \in D_j, \quad k' \in D'_j \setminus \Theta_j \setminus \Phi_j, \quad k' \gg k, \quad \forall j \in J;$$

(ii) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - w_{k',LH} - x_{k',i} - y_{k',i} \leq 0$, where

$$k \in D_j, \quad k' \in D'_j \cap \Theta_j, \quad k' \gg k, \quad \forall j \in J;$$

(iii) $0 \leq w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - 2w_{k',LH} + x_{k',j} \leq 1$, where

$$k \in D_j, \quad k' \in D'_j \cap \Phi_j, \quad k' \gg k, \quad \forall j \in J;$$

Serial No. 10/045,806

In Reply to Office Action mailed June 27, 2006

Page 10 of 19

(iv) $0 \leq w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - 2w_{k',LH} + y_{k',j} \leq 1$, where

$k \in D_j$, $k' \in D_j \cap (\Phi_j \setminus \Phi_j')$, $k' \gg k$, $\forall j \in J$;

(v) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) \leq 0$, where

$k \in D_j$, $k' \in (D_j \setminus D_j') \setminus \Theta_j \setminus \Phi_j$, $k' \gg k$, $\forall j \in J$;

(vi) $w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) - x_{k',i} - y_{k',i} \leq 0$, where

$k \in D_j$, $k' \in (D_j \setminus D_j') \cap \Theta_j$, $k' \gg k$, $\forall j \in J$;

(vii) $0 \leq w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + x_{k',j} \leq 1$, where

$k \in D_j$, $k' \in (D_j \setminus D_j') \cap \Phi_j'$, $k' \gg k$, $\forall j \in J$; and

(viii) $0 \leq w_{k,LH} + u_{k,LH} + v_{k,LH} + z_{k,LH} - 2 \sum_{t \in T} (w_{k',t} + u_{k',t} + v_{k',t} + z_{k',t}) + y_{k',j} \leq 1$, where

$k \in D_j$, $k' \in (D_j \setminus D_j') \cap (\Phi_j \setminus \Phi_j')$, $k' \gg k$, $\forall j \in J$;

<<start underline>>

wherein k , k' are employees;

i , i' , j , j' are locations;

t are leave types;

J is a set of all locations;

T is a set of all leave types;

D_j is a set of all employees with last half leave requests at location j ;

D_j' is a set of all employees whose primary leave request is a last half leave request at location j ;

Θ_j is a set of all employees currently at location j with requests to transfer out of location j ;

Φ_j is a set of all employees with requests to transfer into location j ;

Φ_j' is a set of all employees whose primary transfer request is into location j ;

$u_{k,j}$ is a secondary leave request at location j for employee k ;

Serial No. 10/045,806
In Reply to Office Action mailed June 27, 2006
Page 11 of 19

$v_{k,j}$ is a third preference leave request at location j for employee k;

$w_{k,j}$ is a primary leave request at location j for employee k;

$x_{k,j}$ is a primary request for employee k to transfer into location j;

$y_{k,j}$ is a secondary request for employee k to transfer into location j; and

$z_{k,j}$ is a fourth preference leave request at location j for employee k.

<<end underline>>

10. (Original) The system of Claim 2, wherein said optimization processor is parameter driven and may be executed plural times with different parameter values and configuration settings to generate a variety of solutions from which a user can converge toward an optimal solution.

11. (Original) The system of Claim 2, wherein said optimization processor is operated with distinct sets of parameter values and configuration settings to determine which of said distinct sets meets staffing requirements in such a way that future staffing levels are not compromised.

12. (Currently Amended) A method for near real time optimized processing of all employee transfer requests, leave requests, new hire location assignments, and last half period new hire location assignments of an organization in managing employee staffing, which comprises the following steps:

receiving input data including said transfer requests, said leave requests, employee data, parameter values, and configuration settings from a user interface;

creating decision variables from said input data for use in a mixed integer programming model;

Serial No. 10/045,806
In Reply to Office Action mailed June 27, 2006
Page 12 of 19

generating constraints from said input data such that coefficient values are determined for said decision variables, and constraint sense and right hand values are determined for each of said constraints;
and

solving said mixed integer programming model to generate awards to employees wherein said awards include at least one of transfer and leave awards based on seniority of the employees.

13. (Original) The method of Claim 12, wherein said awards include only said transfer requests, and the step of solving includes determining new hire location assignments.

14. (Original) The method of Claim 12, wherein said awards include only said leave requests.

15. (Original) The method of Claim 12, wherein said awards include both said transfer requests and said leave requests, and the step of solving includes determining said new hire location assignments and said last half period new hire location assignments.

16. (Original) The parameter driven system of Claim 1, further including means for modifying said parameter values to generate parameter value sets from which said optimization processor generates corresponding award sets from which an optimal set may be selected to avoid compromising future staffing requirements.

17. (Original) The parameter driven system of Claim 1, further including means for modifying said configuration settings to generate configuration setting sets from which said optimization processor generates corresponding award sets from which an optimal set may be selected to avoid compromising future staffing requirements.